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listed species were found in the Brush Creek. Besides the writer, Messrs. S. B. Brown, David White, J. W. Beede and R. V. Hennen<sup>8</sup> have examined the Uffington shale at Uffington and vicinity without discovering marine fossils.

Studies of the Conemaugh formation in West Virginia and Maryland by the writer have not revealed a marine fauna at this horizon nor has such been reported by other observers in these and adjoining states, with the exception of the instances mentioned above and two other West Virginia localities reported by Stevenson. These places are: in Wirt county 8 miles north of Burning Springs<sup>9</sup> and at Cutright in Upshur county.<sup>10</sup> These localities have since been studied by members of the West Virginia Geological Survey during the preparation of county reports. From the similarity of the sections given by the different observers<sup>11</sup> the fossiliferous members at these localities also appear to be Brush Creek.

In Ohio the shale is reported by Condit but marine fossils were not found.

The Uffington shale may then be re-defined as follows:

The Uffington shale is a plant-bearing bed of shale, frequently sandy in the lower portion, of non-marine origin, occupying in places the interval between the Upper Freeport coal and the Mahoning sandstone, and indicating by its variable thickness and undulating upper surface that erosion took place over the area of its outcrop before or during the deposition of the Mahoning sandstone. The maximum reported thickness of the shale is 40 feet and, though lacking in many places,

<sup>8</sup> Oral communication from S. B. Brown and R. V. Hennen.

<sup>9</sup> Geol. Soc. America Bull., Vol. 17, 1906, p. 149. "Carboniferous of the Appalachian Basin," by J. J. Stevenson.

<sup>10</sup> Idem., p. 135.

<sup>11</sup> R. V. Hennen, W. Va. Geol. Surv., Wirt, Roane and Calhoun counties, Rept., 1911, p. 258; and I. C. White, W. Va. Geol. Surv., Vol. II., 1903, p. 279 (recent field work by D. B. Reger in the preparation of a report on Upshur county confirms the correlation of I. C. White).

its appearance at widely separated points in Maryland, West Virginia and Ohio shows that its former distribution was perhaps general in the Appalachian Carboniferous area.

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## BOSTON MEETING OF THE AMERICAN CHEMICAL SOCIETY

THE fifty-fifth meeting of the American Chemical Society was held at the Massachusetts Institute of Technology, Cambridge, Mass., from September 10 to September 13, inclusive. The general program was carried out under the able leadership of Professor Julius Stieglitz, president of the society, and Dr. Charles L. Parsons, secretary, while the local arrangements were under the direction of Professor H. P. Talbot, assisted by the chairmen of the numerous committees. The various divisions were presided over by J. E. Breckenridge, T. J. Bryan, E. H. S. Bailey, L. F. Kebler, L. E. Weber, C. L. Alsberg, J. R. Bailey, H. P. Talbot, and H. E. Howe.

During the session, the usual order of business was carried out, consisting of meetings of the council, with general and public meetings. A strong feature of the meeting was the stress placed upon "War Service of the Chemist." A shore dinner at the Hotel Pemberton, held on Tuesday evening, was much enjoyed and served as a pleasant break in the work before the Society. Wednesday evening was given over to the address by President Stieglitz, who took for his subject, "The Outlook for Chemistry in the United States." This address was printed in the issue of Science for October 5.

During the entire week, the time was taken up by the reading of papers.

### DIVISION OF BIOLOGICAL CHEMISTRY

C. L. Alsberg, *Chairman*.

I. K. Phelps, *Vice-Chairman and Secretary*.

Abstracts have been received of the following papers:

*Oxidase action in the nucleus*: W. J. V. OSTERHOUT. The Indian pipe (*Monotropa uniflora*) contains a colorless chromogen which darkens on oxidation. This process takes place more rapidly in the nucleus than in the cytoplasm, indicating that the nucleus is the center of oxidation in the cell.

*The dynamics of the process of death*: W. J. V. OSTERHOUT. Determinations of the electrical

conductivity of living tissue enable us to follow the process of death in the same manner as we follow chemical reactions *in vitro*. The process usually proceeds as a monomolecular reaction which is somewhat accelerated or inhibited at the start. It is probable that we have to do with consecutive reactions, in which case the acceleration or inhibition is easily explained. The same assumption enables us to give a quantitative explanation of injury and of recovery.

*The dynamics of photosynthesis:* W. J. V. OSTERTHOUS and A. R. C. HAAS. When plants of *Ulva* are taken from darkness and exposed to light the process of photosynthesis goes on at a regularly increasing speed until a steady rate is reached. This may be explained by assuming that a catalyst is produced in light. The values calculated upon this hypothesis are in good agreement with the observed values.

*Note on the physiological action of Cordyceps sinensis:* C. L. ALSBERG and J. F. BREWSTER. It is a practise among certain of the Chinese to extract the tufts caused by the growth of *Cordyceps sinensis* on caterpillars and use the extract for medicinal purposes. Extracts made both of the tufts separately and of the tufts with the caterpillars when injected into rabbits proved to be toxic.

*The influence of phosphates on the action of alphacrotonic acid on plants:* J. J. SKINNER and F. R. REID. Alpha crotonic acid in amounts of 25 and 50 p.p.m. was found to be very harmful to wheat plants grown in nutrient culture solutions. The solutions were composed of calcium acid phosphate, sodium nitrate and potassium sulphate and were prepared according to the triangular system. Growth was reduced about 50 per cent. when the material was used in amounts of 50 p.p.m. In cultures containing 80 p.p.m.  $P_2O_5$  growth was reduced 30 per cent., in cultures containing 40 p.p.m.  $P_2O_5$  growth was reduced 45 per cent., and in cultures with no  $P_2O_5$  growth was reduced 55 per cent. When the material was used in the cultures in amounts of 25 p.p.m. growth was reduced about 30 per cent. In cultures having 80 p.p.m.  $P_2O_5$ , growth was reduced 9 per cent., and in those having 40 p.p.m.  $P_2O_5$ , 28 per cent., and where no  $P_2O_5$  was present 34 per cent. Phosphate seemed to have an ameliorating effect on the harmfulness of the crotonic acid.  $NaH_2PO_4$  used in the place of  $CaH_4(PO_4)_2$  in the culture solutions had a similar effect on the action of the crotonic acid. Ex-

periments using  $Na_2HPO_4$  and also  $Na_3PO_4$ , showed that each of these phosphate salts, regardless of the character of the base, in combination had an action antagonistic to the harmfulness of alphacrotonic acid.

*The oxidation of vanillin to vanillic acid by certain soil bacteria:* WILLIAM J. ROBBINS and ELBERT C. LATHROP. A bacterium, apparently specific for vanillin, has been isolated from an Alabama soil. This organism when grown in a medium of inorganic salts with vanillin as the sole source of carbon, in the course of five days completely oxidized vanillin to compounds of a non-phenolic character. The first oxidation product has been isolated and its identity as vanillic acid has been established by the mixed melting points, the crystalline form and solubilities, the color reactions, the neutralization equivalent, methoxyl determination and organic combustion. By means of color reactions the rate of oxidation of vanillin to vanillic acid and the rate of the ensuing oxidation of vanillic acid has been determined. Vanillin has been found in a number of field soils and the infertility of some of these soils may be due to vanillin. Vanillic acid has also been shown to be harmful to growing plants. The biological oxidation of these harmful soil compounds and the effect of fertilizer compounds on this biological transformation is therefore of special interest in soil fertility.

*The value of yeast "vitamine" as a supplement to a rice diet:* A. D. EMMETT and L. H. MCKIM, Research Department of Parke, Davis & Co., Detroit. The criteria for estimating the value of the diet of polished rice supplemented with vitamine for polyneuritic pigeons was to determine the rate of full recovery of pigeons that had been brought out of the typical polyneuritis attack by a treatment of the Seidell yeast vitamine. This was indicated by the body weight curves before and after treatment. The control vitamine-containing diet for the treated birds was natural unpolished rice. Other feeds were also used—corn, barley and oats. It was found that this yeast vitamine preparation was a most excellent agent for bringing about recovery from the typical attack of polyneuritis; that, as a supplement to polished rice, when used in rational amounts (equal to slightly more than the dose needed for treatment) the diet was adequate for producing moderate gains in weight, but that these gains were much less than those obtained with the control or unpolished rice diet. Corn produced smaller gains than unpolished rice

but more than polished rice. Barley produced fair gains for a time but later the pigeons lost weight. Oats proved to be very inferior. The results suggest that this vitamine preparation, when used in amounts commensurate with rational therapy, is a very valuable adjuvant to a vitamine-poor diet but in order to obtain the very best results one should have for the patient a dietary containing foods rich in vitamine.

*The growth promoting value of the lactalbumins obtained after separating casein by (a) hydrochloric acid and (b) lactic acid culture:* A. D. EMMETT and M. E. SLATER, Research Department of Parke, Davis & Co., Detroit. The lactalbumins used were obtained from skim milk whey. In one case, the casein was removed from the skim milk by a slight acidification with hydrochloric acid and in the other it was thrown out by using a lactic acid "starter" and allowing the milk to incubate until sufficient acid was formed to cause the separation. The two lactalbumins were compared as to their growth promoting value by feeding young rats that had been kept on a maintenance ration. It was found, on a low protein plane, that the lactic acid culture lactalbumin had very little growth producing value when compared with the hydrochloric acid lactalbumin. The influence of various factors involved was studied among them—varying the quantity of lactalbumin, adding cystine and increasing the total protein intake.

*The influence of accessory substances on growth, with a low protein ration containing lactalbumin from lactic acid whey:* A. D. EMMETT and M. E. SLATER, Research Laboratory of Parke, Davis & Co., Detroit. Young rats which had been on maintenance were put upon a basal ration low in protein but ample in energy and mineral content. The protein concentrate used was corn gluten. This was supplemented with lactic acid, lactalbumin. Butter fat was omitted. Vitamine preparations (water soluble) were added to the basal relation after a test period showed that the expected rate of growth did not take place. In fact, during this test period, there was almost no response to the change in the ration from maintenance to basal. Upon replacing part of the lard with butter fat, there was a slight increase in growth; adding vitamine preparation B to the basal ration, there was some effect produced; and on adding vitamine preparation A, a decided gain in weight resulted which compared favorably with the growth curve obtained on using the hydrochloric acid lactalbumin.

*On the origin of the humin formed by the acid hydrolysis of proteins III. Hydrolysis in the presence of aldehydes II. Hydrolysis in the presence of formaldehyde:* ROSS AIKEN GORTNER and GEORGE E. HOLM. Hydrolysis in the presence of formaldehyde completely alters the nitrogen distribution obtained by Van Slyke's method. Black insoluble humin is formed from tryptophane and no other known amino acid is concerned in the reaction. The primary reaction of black humin formation involves only the indole nucleus and not the  $\alpha$  amino group of the aliphatic side chain of tryptophane. Formaldehyde forms a soluble humin with tyrosine which is precipitated by  $\text{Ca}(\text{OH})_2$ . Hydrolysis in the presence of formaldehyde causes enormous increases in the ammonia fraction but the increase is not due to ammonia but to volatile alkaline compounds. The detailed paper will appear in the *Jour. Amer. Chem. Soc.*

*On the relative imbibition of gluteins from strong and weak flours:* ROSS AIKEN GORTNER and EVERETT H. DOHERTY. The gluten was washed from both "strong" and "weak" flours and the hydration capacity of the colloids measured by immersing weighed disks in different concentrations of certain acids, allowing them to remain a definite length of time and again weighing. Lactic and acetic acids produced greatest imbibition, the form of these hydration curves being very different from those of hydrochloric and oxalic acids which produced much less hydration. The gluten from a "weak" flour has a much lower rate of hydration and a much lower maximum hydration capacity than has the gluten from a "strong" flour. Gluten from a "weak" flour changes from a gel to a sol at a much lower degree of hydration than does that from a "strong" flour. There is an inherent difference in the colloidal properties of the gluteins from "strong" and "weak" flours and these gluteins would not be identical even if the flours had originally had the same salt and acid content. The paper will be published in *Jour. Agr. Res.*

*The nitrogen distribution in protalbumin and lysalbumin acids:* ROSS AIKEN GORTNER and CORNELIA KENNEDY. Lysalbumin and protalbumin acids were prepared from egg albumen by Paal's method and their nitrogen distribution, together with that of the original egg albumen, determined by Van Slyke's method. No marked difference was observed in any of the fractions although both of the derived products show a somewhat greater apparent lysine content. This is probably due to

ornithine derived from arginine. The analyses furnish no evidence as to whether or not these "acids" are true chemical compounds or as to whether or not their structure is more simple than is that of egg albumen. The paper will appear in the *Jour. Amer. Chem. Soc.*

*The effect of prolonged acid hydrolysis on the nitrogen distribution of fibrin with especial reference to the ammonia fraction:* ROSS AIKEN GORTNER and GEORGE E. HOLM. Fibrin was boiled with 20 per cent. HCl for varying periods of time ranging from 1 hour to 6 weeks, the ammonia fraction increases continuously showing a 150 per cent. increase at the end of six weeks over that obtained at the end of twelve hours. This increase in ammonia comes almost entirely from the deamination of mono amino acids. The ammonia fraction of a twenty-four or forty-eight-hour hydrolysate can not be taken as an absolute measure of amide nitrogen for some "deamination" nitrogen is undoubtedly present, the amount depending both upon the particular protein and the length of hydrolysis. The paper will appear in the *Jour. Amer. Chem. Soc.*

*Comparative analyses of fibrin from different animals:* ROSS AIKEN GORTNER and ALEXANDER J. WUERTZ. Fibrin has been prepared from the blood of cattle, sheep and swine and the nitrogen distribution determined by Van Slyke's method. No differences significantly greater than the expected experimental errors were found. It would thus appear that fibrin from any of these three sources can be used interchangeably in experimental work without invalidating the results. Whether or not this is true for fibrins from other sources remains still an open question. The paper will appear in the *Jour. Amer. Chem. Soc.*

*The nitrogen distribution of fibrin hydrolyzed in the presence of ferric chloride:* CLARENCE AUSTIN MORROW. When a protein is hydrolyzed in the presence of ferric chloride an accurate nitrogen distribution can not be obtained. There is a substantial increase in the ammonia N, due probably to deamination of amino acids at the higher temperature of hydrolysis. The acid soluble humin increases at the expense of a corresponding loss from the "filtrate from the bases," thus indicating that the earlier conclusion regarding the soluble humin N of soils was incorrect and that this fraction of a soil hydrolysis may be of protein origin. Since hydrolysis in the presence of either carbohydrates or ferric chloride radically changes the nitrogen distribution of proteins, it is obvious that

no accurate knowledge of soil proteins can be obtained by applying Van Slyke's method to soils.

*A new form of ultra-filter; its uses in synthetic and biological chemistry:* P. A. KOBER. A new form of ultra-filter is described which depends on pervaporating both dialysis and diffusate solution during dialysis. Its usefulness in filtering off humus and other coloring matter in biological work and organic synthetic work, as well as colloids in general, is pointed out. The apparatus makes it possible now, for the first time, to dialyze quantitatively.

*Studies on Piper bredemeyeri, an adulterant of matico:* A. VIEHOEVER and M. G. MASTIN. A study has been made of the volatile oil obtained from *Piper bredemeyeri*, an adulterant of matico, *Piper angustifolium*. It was found that the volatile oil did not yield asaron, which is obtained from genuine matico, nor matico camphor, obtained from *Piper angustifolium* var. *ossanum*. The oil from *Piper bredemeyeri*, containing over 50 per cent. of dillapiol, was very similar in composition to that reported to be obtained from *Piper mandoni*. The chemical and botanical similarities suggest that the name *Piper mandoni* has been given to plants belonging to the species *Piper bredemeyeri*. A paper on the subject is in preparation.

*Studies on mustards and mustard substitutes:* A. VIEHOEVER, C. O. EWING and J. F. CLEVINGER. Work on monographs of mustards and mustard substitutes has progressed considerably. New supplies from India, China and Japan have been identified on the basis of studies including the botany and chemistry of the seeds, and also studies of plants grown from the seeds. Material of Indian brown mustard proved to be substituted by Indian rape or tori, *Brassica napus* var. *dichotoma*. Chinese mustard, *Brassica juncea*, was found to be usually improperly collected, containing a considerable amount of immature seeds and weed seeds, including generally *Eruca*. A preliminary study of the volatile oils obtained from Chinese mustard, *Brassica juncea*, and Japanese mustard, *Brassica cernua*, indicates that they are mixtures containing only in part allylisothiocyanate. The volatile oil from *Brassica campestris sativa chinensis*, another adulterant of mustard, proved to be crotonylisothiocyanate. This oil has no mustard qualities. Since the plant grows very vigorously, plans are under way to utilize it either for greens and salads or for stock

feed. The seeds yield over 40 per cent. of a fatty oil with the general characteristics of rape oil.

*An alkaloid from lupinus leucopsis:* O. F. BLACK. The European lupines have been very extensively studied especially in respect to their alkaloids. No work has been reported on the native species of the plant which grow abundantly on western ranges. *Lupinus leucopsis*, suspected of causing the poisoning of cattle, was tested for alkaloids and gave positive reactions. The alkaloid was thereupon isolated in the following manner: the seeds were finely ground and extracted by macerating at room temperature with 80 per cent., alcohol slightly acidified with HCl. The alcohol was driven off by boiling in vacuo and the residual solution quantitatively precipitated with Mayer's reagent. The precipitate washed and decomposed with  $H_2S$ , filtered, and the filtrate extracted with chloroform which removed the alkaloid as the hydriodide. On evaporating the solvent the salt remained as lemon yellow needle crystals, mpt.  $246^\circ$ . It could be recrystallized from water or alcohol. The alkaloid, prepared by treating the salt with silver oxide, was colorless and amorphous and resisted attempts to crystallize it. A preliminary analysis indicated that the formula was probably  $C_{16}H_{22}N_2O_4HI$ , which does not correspond with the formula of any alkaloid hitherto isolated from lupines. Also the common European varieties when subjected to the same treatment failed to yield any body of a similar nature. It, therefore, seems reasonable to conclude that it is a new alkaloid. It is intended to continue work on it when more material can be procured.

*On the histology and chemistry of secretory and nectary glands of the cotton plant:* A. VIEHÖEVER and E. E. STANFORD. The occurrence, distribution, and histology of secretory as well as nectary glands has been established. Microphotographs have been prepared which show clearly the structure and lysigenetic character of the secretory glands. The chemistry of these glands is under investigation, and while not yet completed, very interesting results have been obtained. The glands located in parts not exposed to light, especially in seeds and roots, contain gossypol, while those of insolated parts, namely, stems, leaves, bolls and flowers, contain querimeritrin and anthocyan. Other genera belonging together with *Gossypium* to Hibisceae have been studied in regard to the presence of secretory glands. While some of the genera did not show them, others, especially *Thurberia* (wild cotton) showed these glands very con-

spicuously and very similarly arranged as in the case of cotton plants.

*Studies on edible and poisonous beans of the Lima type (Phaseolus lunatus):* A. VIEHÖEVER, C. O. EWING and M. G. MASTIN. Work on cyanogenesis consisted of the investigation of poisonous and edible beans of the Lima type, *Phaseolus lunatus*. Examination of a considerable number of domestic Lima beans disclosed the fact that they all yield hydrocyanic acid under certain conditions, the amount of which, however, does not exceed 10 mg. per 100 gm. of beans. Foreign beans of the same type, imported from the Orient or South America, were found to contain in certain instances a considerably higher amount. As a result of these findings a large number of shipments of such beans, especially Rangoon or Burma beans, were excluded from import. The glucoside, yielding hydrocyanic acid, has been isolated and its characteristics determined. This facilitated the working out of a satisfactory reliable method for obtaining the maximum available amount of hydrocyanic acid from the beans. It also assisted in experiments concerning the removal of the glucoside from the bean.

*Oxalic acid in foods and spices:* A. VIEHÖEVER, W. F. KUNKE, and M. G. MASTIN. A large number of common foods and spices have been examined for the presence of oxalic acid and its salts. In some instances this has been supplemented by quantitative determinations, namely: Rhubarb stalks, contained 0.39 per cent. of oxalic acid and rhubarb leaves contained 0.84 per cent., in the form of soluble oxalates and insoluble calcium oxalate. These amounts were found in fresh material obtained on the market. In the dried root of rhubarb, used as a drug, the amount of oxalic acid was 10.77 per cent., being present in the form of calcium oxalate. No soluble oxalates were found. The amount found in spinach was 0.82 per cent., and that in sweet potatoes 0.10 per cent. In beets, 0.17 per cent., and in dried figs 0.21 per cent. Dasheen contained 0.49 per cent., and the common bean (*Phaseolus vulgaris*) 0.4 per cent. Acheen pepper, containing usually a varying amount of more or less undeveloped fruit, showed 1.61 per cent. oxalic acid in the solid, almost developed fruits, and 3.39 per cent. in the fruits which were more or less empty. The amount of oxalic acid found in ground pepper can possibly be used to detect the presence of added pepper shells.

(To be continued)